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# PATENT SPECIFICATION

731,237



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## COMPLETE SPECIFICATION

### Improvements in or relating to the manufacture of Cast Iron or Steel Shot

I, JOSEF JACOBS a German National, of 1, Amerikastrasse, Cuxhaven, Germany, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention concerns the manufacture of cast iron or steel shot.

Cast iron shot manufactured by spraying melt from a cupola furnace into water usually has a carbon content of 3% or more which cannot be reduced even when steel or mild steel is also melted in with it, because the melt takes up carbon from the coke in the cupola furnace. Shot of such a high carbon content has a white, i.e. a cementite texture and therefore a high degree of brittleness which results in the individual pellets prematurely breaking when it is used as a cutting agent or a blasting agent and thereby ceasing to be effective. In addition such shot causes a high degree of wear and tear on the impeller mechanism. In order to reduce its unfavourable properties, recourse has already been had to decomposing wholly or partly the cementite texture by subjecting the shot to heat treatment and separating the carbon as graphite. By this means, however, the pellets again assume comparatively high degree of softness so that they quickly wear out in use.

The invention seeks to provide a method suitable for the manufacture of cast iron or steel shot having a carbon content lower than 3%, such method at the same time enabling the carbon content to be controlled and with it the properties of the shot with respect to hardness, elasticity and the like, such shot being economical in use. According to the present invention cast iron melted down in the cupola furnace is alloyed with liquid steel after it has been run off and when still in a fluid condition, the thus

obtained alloy being subsequently sprayed into water or the like in known manner. The liquid steel can be produced in a converter or in an electric furnace.

By a suitable choice of the ratio of cast iron melt to steel melt the carbon content of the alloy can be predetermined as desired within wide limits. On the basis of a cupola furnace iron having a 3.2% carbon content and a steel having a 0.1% carbon content there is produced for example by:—

100 kg. cupola iron and 50 kg. steel  
150 kg. alloy with about 2.2% C.

100 kg. cupola iron and 100 kg. steel  
200 kg. alloy with about 1.6% C.

50 kg. cupola iron and 100 kg. steel  
150 kg. alloy with about 1.1% C.

50 kg. cupola iron and 200 kg. steel  
250 kg. alloy with about 0.7% C.

Thus the process permits cast iron or steel shot to be manufactured having any desired carbon content less than 3% and hence of very different quality by changing the ratio of the mixture of the two components of the alloy. Therefore, both soft shot suitable, for example, for the surface treatment of sensitive materials can be produced, or tough, unbreakable shot, as also shot having a harder, breakable pellet, which, however, is much less brittle than the pellet of shot obtained from a pure cupola iron, i.e. shot having a higher carbon content.

The process also provides the possibility of adding quality-improving alloy substances such as silicon, manganese, nickel, chromium, or vanadium, and these substances can be introduced either in liquid or in solid form, either to the steel melt before alloying with the iron or to the liquid steel-iron alloy. Introduction in solid form is rendered possible by the rise in temperature produced by the hot steel in the melt.

Moreover, the shot can be subsequently treated thermally while in broken

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or unbroken condition, by keeping it for an hour, at a temperature of 700 to 800° C. and then chilling it.

The new process also permits a very rapid change to be carried out of the type of shot produced without special circumstances, that is to say without changing the chemical composition and thus introducing new chemical properties of the shot.

What I claim is:—

1. A process for the manufacture of cast iron or steel shot having a carbon content of less than 3%, characterised in that cast iron melted down in the cupola furnace is alloyed after it has been run off when still in a liquid condition with

liquid steel, and the thus obtained alloy is subsequently sprayed in known manner into water or the like.

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2. A process as claimed in Claim 1, which a quality improving alloy substance is added in solid or liquid condition either to the liquid steel before alloying or only to the liquid steel-iron alloy.

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3. A process as claimed in Claim 1 or 2, in which the shot is subjected to a thermal refinement process by being exposed to a temperature of 700 to 800° 30 C. for an hour, and is then chilled.

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